Outstanding Projects of 2004

Four projects in this year's annual progress report exemplify outstanding coordination, design, and implementation:

- Edson Fichter Nature Wetland Project
- Hailey Big Wood River Enhancement Project
- Mud Creek BMP Implementation Project
- Thomas Fork Stream Restoration Project

Summaries for each of these outstanding projects are presented in the following sections.

Thomas Fork Stream Bank Stabilization Project

Introduction

The Bear Lake Regional Commission (BLRC) initiated this project to address an identified sediment and dissolved nutrient loading problem in the Thomas Fork Creek. Specifically, a targeted reach of the Thomas Fork Creek in Bear Lake County, Idaho was selected for implementation of stream bank stabilization practices that were proven effective on prior projects on the Thomas Fork.

Project Goal

The overall goal of the project was stated as follows:

> "Improve the quality of water in the Thomas Fork Creek and stabilize the banks within the targeted reach, so the stream can sustain its beneficial uses as well as improve water quality conditions within the Bear River and Bear Lake."

Project Objectives

To meet this goal, two objectives were defined:

Objective 1 Apply riparian and in-stream reclamation treatments along the Thomas Fork Creek for approximately 2,000 feet along degraded riparian zones.

Objective 2 Develop and implement a project administration, evaluation and environmental stewardship program that determines the effectiveness of the proposed activities and promotes their long-term care.

To meet the project goal and objectives, and to accommodate the needs of the landowner, this project addressed two issues at this site:

- Restricting livestock access to Thomas Fork Creek in this section with a fence and controlled water access.
- Restoring riparian vegetation to correct unstable bank conditions. Unstable bank conditions ultimately increase the total suspended solids within this reach of Thomas Fork Creek.

Best Management Practices (BMPs) were borrowed from Natural Resource Conservation Service (NRCS) designs and applied to suit site conditions. These practices were prepared by NRCS to mitigate impacts from U.S. Highway 89 construction in the same stream reach as this 319 project.

Description

The permitting and implementation of the BMPs were under the direction of the BLRC with assistance from the landowner. Monitoring by Ecosystem Research Institute of Logan, Utah included water quality chemistry and surveys of stream cross-sections. Extra effort was also made to coordinate and inform the following groups:

- Bear River Basin Advisory Group (Idaho).
- Bear River Basin Water Quality Task Force (Utah, Idaho, Wyoming).
- Bear Lake County Soil and Water Conservation District.
- U.S. Army Corp. of Engineers.
- Idaho Department of Water Resources.

Outputs from the project included the following:

- Installing BMPs on approximately 2,000 feet of stream bank and erection of electric fencing at strategic locations along =riparian areas adjacent to pastureland.
- Monitoring using three methods:

  - Water chemistry at two sites.

  - Photographic monitoring at each of the treatment sites (Figure 32).

  - Stream cross-section surveys at four locations in the project area.
- Presenting information about the project at the Bear Lake County Fair.
- Developing landowner maintenance agreements on completed project work.

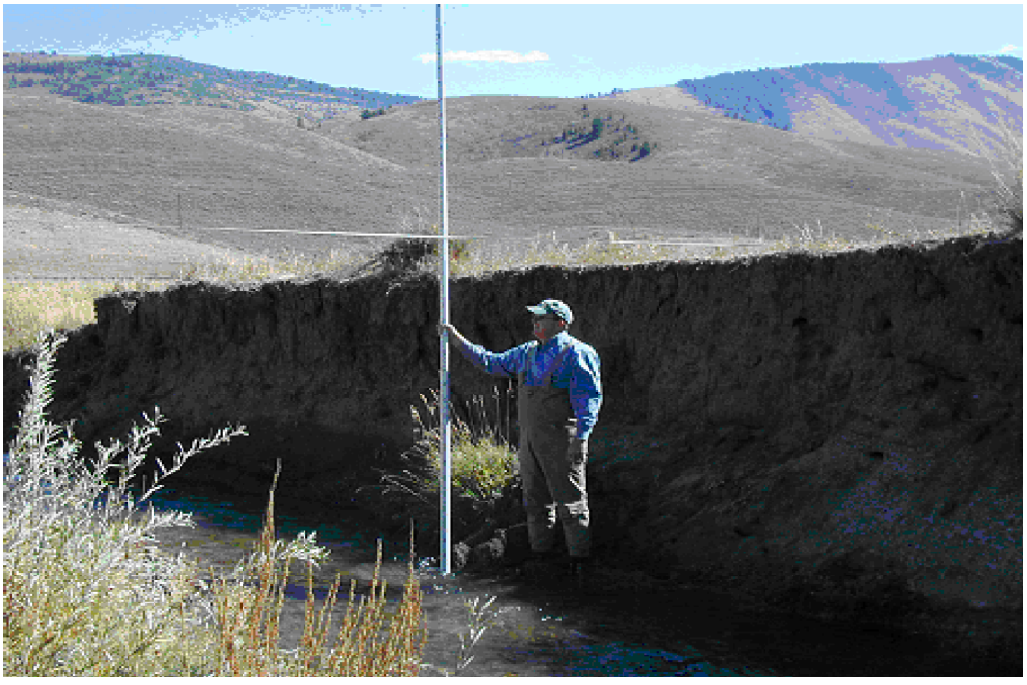

Figure 32. Photo monitoring site prior to bank reshaping

Background

The Thomas Fork Watershed consists of 150,100 acres located in Bear Lake County, Idaho and Lincoln County, Wyoming. The elevation of the valley floor of the watershed is about 6,600 feet above sea level.

Thomas Fork Creek is a tributary to the Bear River, immediately upstream from the diversion of the Bear River into Bear Lake—the latter designated by the State of Idaho as a *Special Resource Water*. Thomas Fork is listed as a 303(d) stream not supporting the beneficial uses of cold water biota, salmonid spawning, and primary and secondary contact recreation.

On its own, Thomas Fork Creek represents a valuable resource of concern. However, in addition to the values of the Thomas Fork, the eutrophication of Bear Lake and the degradation of the Bear River are due, in part, to excessive stream bank erosion from Thomas Fork.

Methods

This project employed BMPs used on prior treatment sites in the same general area for over six years. During the grant application process, for this project, five sections of stream bank were selected for the installation of these BMPs; construction of BMPs on the five sections was completed during the fall of 2003. Three different types of BMP treatments were employed, including stream barbs to direct the flow of the stream to the center of the stream channel, rip-rap along exposed stream bank, and re-vegetation using native vegetation and riparian vegetation seed mix. The stream sections completed are presented in Table 5.

Banks identified as significant contributors to turbidity of Thomas Fork have been *reshaped*, with banks evaluated based on the following criteria for shaping:

- Bank height in excess of five feet
- Riparian zone lacking vegetation
- Angle of bank approaching vertical
- Evidence of soil loss and recent caving

Shaping involves using heavy equipment to reduce the angle of the bank, place rock, and prepare for seeding. A trackhoe is used to excavate the banks to a 3:1 slope and remove excess material. Large angular rock is placed by the trackhoe at the toe of each slope and the bank is smoothed using the trackhoe to prepare the soil for grass-seed. (A trackhoe has proved to be superior to a backhoe based on reach and stability.)

Rip-rap is applied using landowner equipment. Rock—local geologic material quarried from a nearby site and composed of dense, angular material—is placed from the toe of the slope to near the crest of the bank to keep soil in place until vegetation can root.

Grass seed is planted on the upper portion of treated bank to keep soil in place and uptake nutrients. Each site is prepared by dragging a steel grate along the surface, after which seed—a mix of native material that encourages natural function: sheep fescue, crested wheatgrass, and stream bank wheatgrass—is spread by hand. The seeds are then covered to prevent predation by animals. (This seed mix was selected based on site conditions and agronomist recommendation.)

Stream barbs applied to this project were constructed of native geologic material mined from local quarries and use an NRCS design from a previous project along the same stretch. Core material is 1'-3' in diameter while cover material is 2"-10" in diameter and highly angular. Each barb was anchored into the bank and then extended into the flow along the streambed, at a 45° angle, and directed upstream.

Willow stock was produced on site from existing healthy communities and placed to maximize rooting. Cuttings were placed at half-foot intervals along treated areas, or other areas as needed, with each cutting pressed into the soil near the water's edge to make use of the water table. The density of cuttings was increased at rock barb locations, and willow bundles were also applied near barbs. Willow clumps were installed at locations where possible; this method involves excavating (using the trackhoe) complete willow bushes from one location and placing them at the water's edge along treated areas.

Table 5. BMPs applied along 2,230 feet of stream bank on Thomas Fork.

Segment	No. of Barbs	Length of total bank face rip-rap (ft)
A	2	464
B	2	632
C	2	376
D	3	623
E	2	135
Total bank BMPs	12	2,230

Monitoring

Monitoring of this project included the use of three methods: 1) photographs 2) stream transects and 3) water chemistry.

Photo monitoring

Photo monitoring includes taking photos before, during, and after construction, plus bi-annually thereafter. Photo monitoring has been an excellent method to track visual changes in treated areas, providing an educational tool for comparison of before and after effects of stabilized stream banks—as demonstrated by Figure 33 and Figure 34, which illustrate the short-term benefits to the riparian area. Photo monitoring will continue for two to three years, on semi-annual rotations, to document the longer-term success of treatments at this site.

Water chemistry and stream transects

Grab samples and cross-section surveys of the stream channel were taken above and below the project site to evaluate the efficacy of applied BMPs. Nutrients sampled included nitrate, nitrite, ammonia, and total suspended solids. Banks were surveyed to quantify sediment balance. (This work was performed by Ecosystems Research Institute of Logan, Utah, and the information collected will be included under separate cover.)

Maintenance agreement

An agreement for maintenance of the stream bank BMPs was signed by the landowner and is on file with the Bear Lake Regional Commission.

Figure 33. Segment B before construction (above) and six months after construction (below).

Figure 34. Segment C improvements prior to construction (above) and six months after implementation of BMPs (bottom).

Results

Rip-wrap is placed along banks that have been shaped to keep soil in place. This treatment appears to be the most effective method of keeping soil in place until seed can germinate and sprout. Areas of bank that begin to erode after construction are quickly and easily doctored using maintenance rock left on site as per the landowner maintenance agreement.

Barbs are used to deflect the flow of the water away from sensitive areas to encourage growth of riparian vegetation. This method is also highly effective in promoting re-growth of riparian vegetation. Rock for the barbs is provided by nearby quarries—a benefit to the project and the local economy. This method provides a very small cost benefit ratio, and it will continue to be used on Thomas Fork. Other benefits produced by implementing barbs include the creation of pool riffle sequences and the reduction of stream width during low flow. Examples of the improvements realized using barbs can be seen in Figure 35.

Figure 35. Illustration of the effectiveness of bank barbs at protecting degraded areas. The emergent vegetation near the bottom of the photo exists on an aggraded gravel bar produced by barb placement upstream.

Indirectly, barbs provide an environment to further accomplish all the goals of stream bank stabilization. The benefits of barbs include increased dissolved oxygen, reduced water temperature, and improved uptake of nutrients.

Reseeding using native grass seed and willow cuttings provides longevity to the project and improves nutrient uptake while reducing sediment entering the stream. Reseeding with native grass seed often provides results after the first rainstorm or spring thaw, whichever comes first. Once applied, the grass spreads to other areas, stabilizing the soil with the grasses' root mass.

Experimental reseeding was applied at several locations as an impromptu pilot project. After banks are reshaped and toe armoring is completed, re-vegetation was applied using the trackhoe. Strips of pasture grass were grafted from the pasture and applied to the stream bank in a mosaic

pattern. It is anticipated that these dormant grass strips will revive and root during the spring, providing an accelerated initial stage of revegetation.

Willow wattles were placed near bank barbs to further facilitate the precipitation of sediment out of the water column. This method was introduced late in the project and, therefore, only at few locations. Additional experimentation using this method will be pursued to improve survival rate. Those wattles that were constructed effectively reduced velocity in the immediate vicinity of the stream bank.

The success of Thomas Fork stream bank stabilization projects are dependent upon active landowner participation. Donations are provided by the landowner in the form of labor and equipment, and landowners have been encouraged by the amount of farmable acres that are available to them as their banks are stabilized. The 40% match component is being met by the landowner for this project.

Conclusions

The BMPs applied to this section of Thomas Fork Creek have proved adequate, but, based on field observations, additional improvements can be made. Modifications will be made to enhance the success of these efforts to stabilize the Thomas Fork.

Public awareness and attitudes have been influenced by the projects implemented along the Thomas Fork. Proximity to U.S. Highway 89 has prompted passersby to stop and inquire about the project. Local members of the Bear Lake Soil and Water Conservation District have been impressed by these projects and have requested assistance for similar projects on their own property bordering the Thomas Fork—a major paradigm shift in local landowner attitudes toward stream bank stabilization efforts. Other participants included the Idaho Department of Transportation, which is interested in applying BMPs to several segments of the Bear River that threaten the integrity of State Highway 30 from Montpelier to Border at Wyoming

The success of these projects and the level of local interest generated by them have far surpassed any expectations:

- The treatments applied to the Thomas Fork—historically a source of sediment and nutrients to the Bear River and Bear Lake—have proven effective in removing nutrients and reducing sediment. The application of treatments to stream banks has reduced, and will continue to reduce, the sediment and nutrient loading problem for Thomas Fork Creek.
- Moreover, landowner support has been positive in implementing these treatments and changing perceptions. Collaborative partnerships between landowners and the Department of Environmental Quality will continue to reduce the pollutants in the Thomas Fork until its beneficial uses of cold water biota, salmonid spawning and secondary contact are met.